CLAIM AMENDMENTS

A listing of an entire set of claims 1-84 is submitted herewith per 37 CFR §1.121 to replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) A method comprising:

providing at least one spread sequence portion [in parallel];

providing a cyclic redundancy; and

forming a transmitted sequence based on an arrangement of the spread sequence portion [in parallel] and the cyclic redundancy,

wherein the spread sequence portion comprises a baseband chip-level sequence computed according to:

$$s[i,b]=\sum_{u=1}^{U} A_u \sum_{k=0}^{K-1} d_u[k,b]c[i,b]W_u[i-Nk]\ ,\quad 0\le i\le NK-1$$

wherein i is an integer indicating the chip number, b is an integer indicating the data block, $d_u[k,b]$ is the k^{th} data symbol on channelization code channel u for the b^{th} data block, $c[i,b]$ is the value of the long/scrambling code sequence on chip i of data block b, $W_u[i]$ is the length N channelization sequence for the u^{th} channelization code channel, U denotes the number of active channelization code channels, K denotes the number of successive channelization -code intervals, and the factor A_u denotes the power control gain factor for the u^{th} channelization code channel.

2. (Original) The method of claim 1, wherein the spread sequence portion is a fraction of a spread sequence.

3. (Original) The method of claim 1, wherein the spread sequence portion is at least one spread sequence.

4. (Original) The method of claim 1, wherein the spread sequence portion comprises a plurality of concatenated spread sequences.

5. (Cancelled)

6. (Cancelled)

7. (Original) The method of claim 1, wherein the spread sequence portion comprises a multicode sequence.

8. (Original) The method of claim 1, wherein the forming comprises inserting cyclic redundancy to the spread sequence portion for at least one symbol boundary.

9. (Original) The method of claim 1, wherein the cyclic redundancy comprises zero value chips.

10. (Original) The method of claim 1, wherein the cyclic redundancy comprises a known sequence.

11. (Currently Amended) [The method of claim 1,] <u>A method comprising:</u>

<u>providing at least one spread sequence portion;</u>

<u>providing a cyclic redundancy; and</u>

<u>forming a transmitted sequence based on an arrangement of the spread sequence portion and the cyclic redundancy,</u>

wherein the transmitted sequence is formed according to <u>at least one of</u>:

$$x[i,b]=\begin{cases} s[i,b], & 0 \le i \le NK-1 \\ s[i-NK,b], & NK \le i \le NK+L_p-1 \end{cases}$$

$$\underline{x[i,b]=\begin{cases} s[i+NK-L_p,b], & 0 \le i \le L_p-1 \\ s[i-L_p,b], & L_p \le i \le NK+L_p-1 \end{cases}}$$

wherein i is an integer indicating the chip number, b is an integer indicating the data block, $s[i,b]$ is the baseband chip-level sequence, N denotes the length of the [Walsh] <u>channelization</u> codes, K denotes the number of successive [Walsh] <u>channelization</u>-code intervals, and L_p indicates the length of the cyclic redundancy.

12. (Cancelled)

13. (Original) The method of claim 1, wherein the forming of the transmitted sequence comprises inserting the cyclic redundancy as a cyclic prefix to at least one spread sequence portion and as a cyclic postfix to at least one spread sequence portion.

14. (Currently Amended) A communication apparatus comprising:

a transmitting device to form a transmitted sequence based on an arrangement of a spread sequence [in parallel] and a cyclic redundancy; and

at least one antenna for transmitting the transmitted sequence,

wherein the spread sequence comprises a baseband chip-level sequence computed according to:

$$s[i,b]=\sum_{u=1}^{U}A_u\sum_{k=0}^{K-1}d_u[k,b]c[i,b]W_u[i-Nk]\ ,\quad 0\le i\le NK-1$$

wherein i is an integer indicating the chip number, b is an integer indicating the data block, $d_u[k,b]$ is the k^{th} data symbol on channelization code channel u for the b^{th} data block, $c[i,b]$ is the value of the long/scrambling code sequence on chip i of data block b, $W_u[i]$ is the length N channelization sequence for the u^{th} channelization code channel, U denotes the number of active channelization code channels, K denotes the number of successive channelization-code intervals, and the factor A_u denotes the power control gain factor for the u^{th} channelization code channel.

15. (Original) The communication apparatus of claim 14, wherein the spread sequence portion is a fraction of a spread sequence.

16. (Original) The communication apparatus of claim 14, wherein the spread sequence portion is at least one spread sequence.

17. (Original) The communication apparatus of claim 14, wherein the spread sequence portion comprises a plurality of concatenated spread sequences.

18. (Cancelled).

19. (Cancelled).

20. (Original) The communication apparatus of claim 14, wherein the spread sequence portion comprises a multicode sequence.

21. (Original) The communication apparatus of claim 14, wherein the forming of the transmitted sequence comprises inserting cyclic redundancy to the spread sequence for at least one symbol boundary.

22. (Original) The communication apparatus of claim 14, wherein the cyclic redundancy comprises zero value chips.

23. (Original) The communication apparatus of claim 14, wherein the cyclic redundancy comprises a known sequence.

24. (Currently Amended) [The communication apparatus of claim 14,] <u>A communication apparatus, comprising:</u>

<u>a transmitting device to form a transmitted sequence based on an arrangement of a spread sequence and a cyclic redundancy; and</u>

<u>at least one antenna for transmitting the transmitted sequence,</u>

wherein the transmitted sequence is formed according to at least one of:

$$x[i,b] = \begin{cases} s[i,b], & 0 \le i \le NK-1 \\ s[i-NK,b], & NK \le i \le NK+L_p-1 \end{cases}$$

$$x[i,b] = \begin{cases} s[i+NK-L_p,b], & 0 \le i \le L_p-1 \\ s[i-L_p,b], & L_p \le i \le NK+L_p-1 \end{cases}$$

wherein *i* is an integer indicating the chip number, *b* is an integer indicating the data block, *s*[*i*,*b*] is the baseband chip-level sequence, *N* denotes the length of the [Walsh] <u>channelization</u> codes, *K* denotes the number of successive [Walsh] <u>channelization</u>-code intervals, and L_p indicates the length of the cyclic redundancy.

25. (Cancelled).

26. (Original) The communication apparatus of claim 14, wherein the forming of the transmitted sequence comprises inserting the cyclic redundancy as a cyclic prefix to at least one spread sequence portion and as a cyclic postfix to at least one spread sequence portion.

27. (Currently Amended) A communication system comprising:

means for providing at least one spread sequence portion; and

means for inserting a cyclic redundancy to the spread sequence portion to form a transmitted sequence,

wherein the spread sequence comprises a baseband chip-level sequence computed according to:

$$s[i,b]=\sum_{u=1}^{U}A_u\sum_{k=0}^{K-1}d_u[k,b]c[i,b]W_u[i-Nk]\ ,\quad 0\leq i\leq NK-1.$$

wherein i is an integer indicating the chip number, b is an integer indicating the data block, $d_u[k,b]$ is the k^{th} data symbol on channelization code channel u for the b^{th} data block, $c[i,b]$ is the value of the long/scrambling code sequence on chip i of data block b, $W_u[i]$ is the length N channelization sequence for the u^{th} channelization code channel, U denotes the number of active channelization code channels, K denotes the number of successive channelization-code intervals, and the factor A_u denotes the power control gain factor for the u^{th} channelization code channel.

28. (Original) The communication system of claim 27, further comprising means for creating a cyclic redundancy.

29. (Currently Amended) A computer readable medium storing a computer program comprising:

computer readable code for forming a sequence based on an arrangement of a cyclic redundancy and at least one spread sequence portion [in parallel]; and

computer readable code for transmitting the sequence,

wherein the spread sequence comprises a baseband chip-level sequence computed according to:

$$s[i,b]=\sum_{u=1}^{U}A_u\sum_{k=0}^{K-1}d_u[k,b]c[i,b]W_u[i-Nk]\ ,\ \ 0\le i\le NK-1.$$

wherein i is an integer indicating the chip number, b is an integer indicating the data block, $d_u[k,b]$ is the k^{th} data symbol on channelization code channel u for the b^{th} data block, $c[i,b]$ is the value of the long/scrambling code sequence on chip i of data block b, $W_u[i]$ is the length N channelization sequence for the u^{th} channelization code channel, U denotes the number of active channelization code channels, K denotes the number of successive channelization-code intervals, and the factor A_u denotes the power control gain factor for the u^{th} channelization code channel.

30. (Original) The computer readable medium of claim 29, wherein the spread sequence portion is a fraction of a spread sequence.

31. (Cancelled).

32. (Cancelled).

33. (Original) The computer readable medium of claim 29, wherein the at least one spread sequence portion comprises a baseband chip-level sequence.

34. (Cancelled)

35. (Original) The computer readable medium of claim 29, wherein the spread sequence portion comprises a multicode sequence.

36. (Original) The computer readable medium of claim 29, wherein the forming comprises inserting cyclic redundancy to the spread sequence portion for at least one symbol boundary.

37. (Cancelled).

38. (Original) The computer readable medium of claim 29, wherein the cyclic redundancy comprises a known sequence.

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Previously Presented) A method of operating a communication apparatus, comprising:

converting a plurality of receive samples from at least one spread sequence portion into a plurality of frequency domain samples;

determining an equalized signal based on the frequency domain samples; and

determining a plurality of frequency domain equalization weights for the frequency domain samples, wherein the frequency domain equalization weights are determined based on at least one of a power weight, a plurality of frequency domain channel estimates, at least one noise power, at least one interference power, and at least one noise plus interference power.

43. (Previously Presented) The method of claim 42, further comprising:

determining a time domain signal estimate based on the frequency domain equalization weights and frequency domain samples.

44. (Original) The method of claim 42, wherein the receive samples include cyclic redundancy.

45. (Original) The method of claim 44, wherein the receive samples including cyclic redundancy are converted into the plurality of frequency domain samples.

46. (Original) The method of claim 42, further comprising: receiving the receive samples at a plurality of receiver branches.

47. (Original) The method of claim 42, wherein the receive samples comprise chip-spaced samples.

48. (Original) The method of claim 42, wherein the frequency domain equalization weights are determined based on a power weight, a plurality of frequency domain channel estimates, and one of at least one noise power, at least one interference power, and at least one noise plus interference power.

49. (Previously Presented) The method of claim 42, wherein the frequency domain equalization rates are determined according to:

$$\mathbf{w}[k,b] = \left(\sum_{j=1}^{J} \mathbf{H}_j[k,b]\mathbf{H}_j^H[k,b] + \sigma^2\mathbf{I} \right)^{-1} \mathbf{H}_1[k,b]$$

wherein J is the number of interferers plus one, $\mathbf{H}_j[k,b]$ is the Mx1 vector of channel gains between the j^{th} incident signal and the M receive antennas at frequency bin k and data block b, and σ^2 represents the noise power of the receive elements after despreading.

50. (Previously Presented) The method of claim 42, wherein the frequency domain equalization rates are determined according to:

$$\mathbf{w}[k,b] = \left\{ \mathbf{\Theta}[k,b]\left(\mathbf{\Theta}^H[k,b]\mathbf{\Theta}[k,b]\right)^{-1} \right\}_1$$

wherein $\{\ \}_i$ denotes the i^{th} column of the matrix inside the brackets, $\mathbf{\Theta}[k,b] = [\mathbf{H}_1[k,b] \quad \mathbf{H}_2[k,b] \quad \cdots \quad \mathbf{H}_J[k,b]]$, and $\mathbf{H}_j[k,b]$ is the Mx1 vector of channel gains between the j^{th} incident signal and the M receive antennas at frequency bin k and data block.

51. (Previously Presented) The method of claim 42, wherein the frequency domain equalization weights are determined according to:

$$\mathbf{w}[k,b] = \frac{\sqrt{\alpha}\mathbf{H}[k,b]}{\alpha\mathbf{H}^H[k,b]\mathbf{H}[k,b] + \sigma^2(k)}$$

wherein the Mx1 vector $\mathbf{H}[k,b]$ is $[H_1[k,b]\ H_2[k,b]\ \ldots\ H_M[k,b]\ ]^T$, $H_i[k,b]$ is the frequency domain channel gain at the i^{th} receive antenna, $\sigma^2(k)$ is the noise power on the k^{th} frequency bin, and α is the ratio of the transmit power during the data portion to the transmit power during the training interval.

52. (Currently Amended) The method of claim 42, wherein the frequency domain equalization weights are scaled according to:

$$\beta = \frac{1}{\frac{1}{NK}\sum_{k=0}^{NK-1}\mathbf{w}^H[k,b]\mathbf{H}[k,b]}$$

wherein the Mx1 vector $\mathbf{H}[k,b]$ is $[H_1[k,b]\ H_2[k,b]\ \ldots\ H_M[k,b]\ ]^T$, $H_i[k,b]$ is the frequency domain channel gain at the i^{th} receive antenna, N denotes the length of the [Walsh] <u>channelization</u> codes, K denotes the number of successive [Walsh] <u>channelization</u>-code intervals, and **w**[k,b] is the frequency domain equalization weight.

53. (Original) The method of claim 42, further comprising: removing a cyclic redundancy from the receive samples prior to converting to the frequency domain samples.

54. (Previously Presented) The method of claim 42, wherein the frequency domain equalization weights are determined according to:

$$\mathbf{w}[k,b] = \frac{\mathbf{H}[k,b]}{\mathbf{H}^H[k,b]\mathbf{H}[k,b] + \frac{\sigma^2(k)}{\alpha}}$$

wherein the Mx1 vector $\mathbf{H}[k,b]$ is $[H_1[k,b]\ H_2[k,b]\ \ldots\ H_M[k,b]\ ]^T$, $H_i[k,b]$ is the frequency domain channel gain at the i^{th} receive antenna, $\sigma^2(k)$ is the noise power on the k^{th} frequency bin, and α is the ratio of the transmit power during the data portion to the transmit power during the training interval.

55. (Original) A communication apparatus comprising:

means for converting a plurality of receive samples from at least one spread sequence portion into a plurality of frequency domain samples;

means for determining an equalized signal based on the frequency domain samples; and

means for determining a plurality of frequency domain equalization weights for the frequency domain samples, wherein the frequency domain equalization weights are determined based on at least one of a power weight, a plurality of frequency domain channel estimates, at least one noise power, at least one interference power, and at least one noise plus interference power.

56. (Previously Presented) The communication apparatus of claim 55, further comprising:

means for determining a time domain signal estimate based on the frequency domain equalization weights and frequency domain samples.

57. (Previously Presented) A communication apparatus comprising:

at least one antenna for receiving a plurality of receive samples; and

a receiving device to convert the plurality of receive samples from at least one spread sequence portion into a plurality of frequency domain samples, to determine an equalized signal based on the frequency domain samples and to determine a plurality of frequency domain equalization weights for the frequency domain samples, wherein the frequency domain equalization weights are determined based on at least one of a power weight, a plurality of frequency domain channel estimates, at least one noise power, at least one interference power, and at least one noise plus interference power.

58. (Original) The communication apparatus of claim 57, wherein the receiving device determines a plurality of frequency domain equalization weights for the frequency domain samples, and determines a time domain signal estimate based on the frequency domain equalization weights and frequency domain samples.

59. (Original) The communication apparatus of claim 57, wherein the receive samples include cyclic redundancy.

60. (Original) The communication apparatus of claim 59, wherein the receive samples including cyclic redundancy are converted into the plurality of frequency domain samples.

61. (Original) The communication apparatus of claim 57, wherein the receiver device comprises a plurality of receiver branches to receive the receive samples.

62. (Original) The communication apparatus of claim 57, wherein the receive samples comprise chip-spaced samples.

63. (Previously Presented) The communication apparatus of claim 57, wherein the frequency domain equalization weights are determined based on a power weight, a plurality of frequency domain channel estimates, and one of at least one noise power, at least one interference power, and at least one noise plus interference power.

64. (Previously Presented) The communication apparatus of claim 57, wherein the frequency domain equalization rates are determined according to:

$$\mathbf{w}[k,b]=\left(\sum_{j=1}^{J}\mathbf{H}_j[k,b]\mathbf{H}_j^H[k,b]+\sigma^2\mathbf{I}\right)^{-1}\mathbf{H}_1[k,b]$$

wherein J is the number of interferers plus one, $\mathbf{H}_j[k,b]$ is the Mx1 vector of channel gains between the j^{th} incident signal and the M receive antennas at frequency bin k and data block b, and σ^2 represents the noise power of the receive elements after despreading.

65. (Previously Presented) The communication apparatus of claim 57, wherein the frequency domain equalization rates are determined according to:

$$\mathbf{w}[k,b]=\left\{\boldsymbol{\Theta}[k,b]\left(\boldsymbol{\Theta}^H[k,b]\boldsymbol{\Theta}[k,b]\right)^{-1}\right\}_1$$

wherein $\{\ \}_i$ denotes the i^{th} column of the matrix inside the brackets, $\mathbf{\Theta}[k,b]=\left[\mathbf{H}_1[k,b]\quad \mathbf{H}_2[k,b]\quad \cdots \quad \mathbf{H}_J[k,b]\right]$, and $\mathbf{H}_j[k,b]$ is the Mx1 vector of channel gains between the j^{th} incident signal and the M receive antennas at frequency bin k and data block.

66. (Previously Presented) The communication apparatus of claim 57, wherein the frequency domain equalization weights are determined according to:

$$\mathbf{w}[k,b]=\frac{\sqrt{\alpha}\mathbf{H}[k,b]}{\alpha\mathbf{H}^H[k,b]\mathbf{H}[k,b]+\sigma^2(k)}.$$

wherein the Mx1 vector $\mathbf{H}[k,b]$ is $[H_1[k,b]\ H_2[k,b]\ \ldots\ H_M[k,b]\ ]^T$, $H_i[k,b]$ is the frequency domain channel gain at the i^{th} receive antenna, $\sigma^2(k)$ is the noise power on the k^{th} frequency bin, and α is the ratio of the transmit power during the data portion to the transmit power during the training interval.

67. (Currently Amended) The communication apparatus of claim 57, wherein the frequency domain equalization weights are scaled according to:

$$\beta=\frac{1}{\frac{1}{NK}\sum_{k=0}^{NK-1}\mathbf{w}^H[k,b]\mathbf{H}[k,b]}$$

wherein the Mx1 vector $\mathbf{H}[k,b]$ is $[H_1[k,b]\ H_2[k,b]\ \ldots\ H_M[k,b]\ ]^T$, $H_i[k,b]$ is the frequency domain channel gain at the i^{th} receive antenna, N denotes the length of the [Walsh] <u>channelization</u> codes, K denotes the number of successive [Walsh] <u>channelization</u>-code intervals, and **w**[k,b] is the frequency domain equalization weight.

68. (Original) The communication apparatus of claim 57, wherein the receiving device removes a cyclic redundancy from the receive samples prior to converting to the frequency domain samples.

69. (Previously Presented) The communication apparatus of claim 57, wherein the frequency domain equalization weights are determined according to:

$$\mathbf{w}[k,b]=\frac{\mathbf{H}[k,b]}{\mathbf{H}^H[k,b]\mathbf{H}[k,b]+\frac{\sigma^2(k)}{\alpha}}$$

wherein the Mx1 vector $\mathbf{H}[k,b]$ is $[H_1[k,b]\ H_2[k,b]\ \ldots\ H_M[k,b]\ ]^T$, $H_i[k,b]$ is the frequency domain channel gain at the i^{th} receive antenna, $\sigma^2(k)$ is the noise power on the k^{th} frequency bin, and α is the ratio of the transmit power during the data portion to the transmit power during the training interval.

70. (Previously Presented) A computer readable medium including a program comprising:

computer readable code for converting a plurality of receive samples from at least one spread sequence portion into a plurality of frequency domain samples;

computer readable code for determining an equalized signal based on the frequency domain samples; and

computer readable code for determining a plurality of frequency domain equalization weights for the frequency domain samples, wherein the frequency domain equalization weights are determined based on at least one of a power weight, a plurality of frequency domain channel estimates, at least one noise power, at least one interference power, and at least one noise plus interference power.

71. (Previously Presented) The computer readable medium of claim 70, further comprising:

computer readable code for determining a time domain signal estimate based on the frequency domain equalization weights and frequency domain samples.

72. (Original) The computer readable medium of claim 70, wherein the receive samples include cyclic redundancy.

73. (Original) The computer readable medium of claim 72, wherein the receive samples including cyclic redundancy are converted into the plurality of frequency domain samples.

74. (Original) The computer readable medium of claim 70, further comprising: receiving the receive samples at a plurality of receiver branches.

75. (Cancelled).

76. (Cancelled).

77. (Cancelled).

78. (Cancelled).

79. (Cancelled).

80. (Cancelled)

81. (Original) The computer readable medium of claim 70, further comprising: removing a cyclic redundancy from the receive samples prior to converting to the frequency domain samples.

82. (Cancelled)

83. (Cancelled)

84. (Cancelled)